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ARTICLE VIII.

THE PRODUCTION OF VITAL FORCE.

BY EDWARD JARVIS, M.D.,

FELLOW OF THE SOCIETY.

Read at the Annual Meeting, May 30, 1849.

MR. PRESIDENT AND GENTLEMEN,

“THEY that be whole need not a physician, but they that are sick.” So we were taught near two thousand years ago by the highest authority, and so the world has practically told us ever since.

Our education has made our calling exclusively a curative and not a conservative one, and the business of our responsible lives has confined us to it. Our thoughts are devoted to, our interests are concerned in, and our employments are connected solely with, sickness, debility or injury—with diminution of life in some of its forms. But with health, with fulness of unalloyed or unimpaired life, we, professionally, have nothing to do.

Nevertheless, as the prudent seaman, before he takes his ship from the hands of the pilot, on the open sea, and assumes to guide it through the unmarked ocean, first ascertains exactly the position,

the latitude, and longitude of his own harbor, to which he is to bring his ship back again, in order that he may know when and where his voyage shall end, so it may be well for us, before we assume the care of the body in sickness, to ascertain precisely the state and condition of perfect health—the standard of power and action to which we wish to bring back the bodily organization and functions from their wanderings in the devious paths of disease. It is well to know the standard of perfect health, in order that we may compare the diseased state with it, and measure the extent of the error, and determine how much change shall be required for the perfect restoration.

This consideration may very properly interest us as healers of disease. But there are other considerations that ought to interest us, as philosophers and philanthropists, and engage our attention to see whether something may not be done for vitality, beside the mere battling with negations; whether the average standard of human health and strength, the usual quantity and duration of life, which the world now enjoy, are all that they can obtain from the means that are placed in their hands, and whether, after we have done all that our professional responsibility requires, and have set our patients free from disease, something more may not be super-added, and a higher degree and a larger expansion of life may not be given to mankind.

For this consideration of health, it is not necessary, now and here, to review the facts of Anatomy

and the principles of Physiology. We are sufficiently familiar with these. We know the organization of the living body and the functional action of its parts. We understand the conditions of life, the necessity of free play of all the organs, and the need of certain supplies and co-operation on our part. We recognize the want of food for nutrition, of air for respiration, of clothing and bathing for the surface, and of a certain measure of exercise for the brain and the muscular system. All these, we know, are essential to the maintenance of life, and without them life must diminish or cease.

There is no fixed measure for all or any of these actions, or for the supply of the animal wants, short of which we cannot come, and beyond which we cannot pass; but there is a wide range for all in which life may be kept up, or, at least, it is not extinguished; and yet, we know that life is not the same in all this variety of action and management; life is not a fixed quantity that cannot vary whatever may be the care bestowed upon it. But its extent or degree varies with all the circumstances affecting the organs and functions.

The original organization depends very much on parentage. The precise influence of the parent upon the child has not yet been determined. The parents can give to the child no other qualities than those which they possess when they give it the germ of life; and thus the qualities of the father and mother descend to their offspring, and health and disease, or rather that perfect organization which

secures regularity of action, and that imperfect organization which creates susceptibility of disorder, are transmitted from generation to generation.

HUMAN CONSTITUTION.—VITAL CAPITAL.—VITAL FORCE.

The aggregation of all the physical powers, the original organization, the united energies of the nutritive, respiratory, cutaneous, locomotive, and nervous actions, and the predominance of the vital over the chemical affinities, co-operate in the production of *vital force*; and these together make up what is commonly called the *constitution* of man—that is, his power for labor or endurance—his power of accomplishing his purposes, or resisting the causes of injury.

This constitution, or this quantum of vital force, may be considered as the *capital of life*, with which man operates, does all his work, enjoys all his pleasures, and sustains himself in his present being.

Some few persons have only vital force sufficient to barely sustain life. They can digest their food, and perform the other functions necessary for the replenishment of the exhausted powers, and no more. They can only keep their vital machines in operation. But most persons have more than this. After supplying their natural wants, and raising the power of the machine to its highest healthy point, then deducting all the vital force necessary for these from the whole constitutional force, there is in them a surplus of energy left to be disposed of otherwise; and this may be expended, at their own will, in ac-

tion of the muscles or of the brain, for profit or for pleasure.

If the constitutional power is considered as the capital of life, this surplus energy may be considered as the *income of life*. This may be expended daily, and yet leave that capital unimpaired. But this expenditure must be limited, in each day, to the quantity of vital force that is generated by each day's nutrition, and in each night's sleep.

This constitution, or quantity of vital force, must necessarily differ in different persons, and in some it differs very widely. There are differences in the primordial elements, in the original organization, in the distribution of strength through the several organs, in the tenacity of the vital principle, and in the early development of the powers.

There are also differences in the subsequent management of the system, and in the appropriation of the surplus energies. The animal organization is first determined by the Creator; the constitution is next developed by those who have the care of childhood and youth, and then it is entrusted to the hands of man himself, for preservation and for use. The Creator does not retain absolute control over the organs, nor has He endowed them with a certain and irresistible force, by which they shall supply their own wants, perform their functions, and regulate their actions in the manner which is best for the whole. All of these admit of various degrees; and, in this broad latitude, each one must seek out

for himself that degree which is best, and determine what degree shall be allowed.

ONE WAY PRODUCES THE MOST VITAL FORCE.

In the management of all the organs of the body, in the supply of the wants, in the use of the surplus energies, in the action of the brain and the muscles, in the discipline and the indulgence of the passions and propensities, and in all the circumstances with which a man surrounds himself, there is, in regard to each, only one way by which the greatest quantity of vital force is produced, health and strength maintained in their highest degrees, and life enjoyed in its widest expansion: and it requires watchfulness to discover that path, and unfaltering discipline to walk in it; because "strait is the gate, and narrow is the way, which leadeth unto life"—perfect physical as well as spiritual life—"and few there be that find it."

As in some mountain of regular acclivity there is a point of elevation which is higher than all the rest, and from which all divergence is descent, and he that would stand the highest must place himself there, and if he depart from this point, to the right or the left, he goes downward—it may be but a hair-breadth, but it is none the less certainly to that extent downward—so, in the maintenance of any one's life, there is a line of conduct which is above and better than all others; and there alone can he enjoy the largest amount of vitality, for there alone is the greatest amount of vital force produced; and

any departure from this line, however small, is inevitably followed by a corresponding depression of life. It may be but an infinitesimal of an error, but precisely to that extent is the vital deterioration.

We can approach this line of highest health—or the most perfect action and largest power—only by the most faithful compliance with the laws of nature, and the complete adaptation of the material to the wants of life, and of the exertions to the powers of action. The law of adaptation and fitness is as imperative in regard to the vital machinery, and to the composition of the materials of life, as it is in regard to the machinery of dead matter, or the composition of dead mixtures.—These are perfect, in their operations and effects, in proportion to the niceness of their workmanship, or the skill and success in their adaptation.

EVERY ERROR IN LIFE PRODUCES ITS PROPORTIONATE
DIMINUTION OF VITAL FORCE.

The laws of life are as fixed as the laws of matter. Cause and consequence, in exact relation and in inevitable succession, are as inseparably connected in one as in the other. In life, there is no effect without a corresponding cause. In any definite organization, the quantity of vital force which is generated, the amount of health, strength, and enjoyment, which is obtained, are in mathematically exact proportion to the fulfilment of the conditions of life. The fulfilment of any condition is

inevitably followed by a corresponding degree of vital power, and any failure in regard to any condition — any error, however slight — is as certainly followed by a corresponding loss of power, or a proportionate diminution of vital force.

The capital of life, and capital in trade, are both subject to somewhat similar conditions. Both need certain discretion in management; both are sustained, and even increased, by faithfulness to their conditions; and both are diminished by every error. As, with the merchant, every disadvantageous investment, every neglect of the means of due profit, every expense in the conduct of business beyond what is necessary for its success, and every other expenditure beyond the income, lessen the amount of his pecuniary capital; so, every neglect of the due means of recuperating life, every failure of proper food, in time or in quantity, every tax upon the digestive organs beyond what the nutrition of the body requires, every inhalation of weakened or vitiated air, every excess of labor by muscle or by brain, every privation of sleep, all expenditure of power beyond the average daily strength — each one of these, whether great or small, diminishes, in its proportionate degree, the vital capital.

EFFECTS OF ERRORS ACCUMULATE.

With the merchant, the effect of small and repeated pecuniary losses is accumulative; and, however little they may attract attention, yet, after many repetitions, for a long period, they compel him to

feel them in the diminution of his capital, perhaps in embarrassment. So, the consequences of errors in the management of life accumulate; and, at last, are felt in the slackened energies, perhaps in failure in some of the functions, in some marked debility, or acknowledged disease.

The unfortunate merchant may refer his embarrassment to some recent loss, to some absconding debtor, or to some shipwreck or fire; but if his estate had not been impaired by his previous and repeated losses, which had been individually too small for his notice, the last and perceptible loss might perhaps have been easily borne.

So, the man who, however slightly but perseveringly, errs in diet, at last becomes dyspeptic. He may not be a gourmand, yet he may be rather a free or merely a careless liver, and eat that which is not digested with perfect ease, or he may consume a little more food than his nutrition requires; he may repeat this for months, perhaps for years, without feeling any especial inconvenience. But after a long period, he begins to feel somewhat oppressed after his meals, and his oppression gradually increases, yet so slowly that he hardly recognizes its advancement, and refers it to no assignable cause. Yet, at last, he is compelled to see and acknowledge the connection between his diet and his suffering; and then he wonders that his free or thoughtless habits of living, which had been harmless and agreeable, should now become oppressive and injurious.

Some farmers, mechanics, and other laborers, overtask their muscular systems during the early and middle periods of life. They work twelve, thirteen, fourteen, and some more, hours a day, and expend more power in each day than they regain in the night. They continually overdraw their income of strength, and expend from their capital; until, at last, they can no longer make this extraordinary exertion; and then they are obliged to select lighter employments, for, before they are old in years, they are decrepit in power, because they have expended their capital of life too early.

In like manner, the ambitious student may overstep the average power of his brain, and give a little more time daily to his mental labor, than his nervous system can bear; or exhaust so much nervous energy in the operations of the mind, that there is not enough left to sustain the physical functions. He may carry on this exhaustive process for years, without seeming to suffer, until the accumulated consequences of his repeated errors become perceptible; and then he is manifestly an invalid, perhaps dyspeptic, and his brain is unable to do its accustomed work.

When any one dwells in the foul air of some jails, or of the houses of some of the poor, where whole families occupy a single apartment, or of the rooms of others who admit no fresh air; or when he accustoms himself to breathe the exhausted air of some crowded shops, or lecture rooms, no perceptible injury is at first felt, nor even any great

inconvenience, except the discomfort of unpleasant sensations, and some oppression; and even these seem to cease by the blunting of the sensibilities, and then he can live in such rooms, or work in such shops, or frequent such assembly rooms, without being conscious of suffering any injury. But, after a long period, the evil consequences of breathing impure air reveal themselves. The skin loses its ruddy hue, the muscles lose some of their natural hardness and contractility, the mental faculties are less clear, and the moral powers weaker; the functions are carried on with less energy, and the body is more susceptible of diseases, especially those of the adynamic order: and, moreover, for want of recuperative energy, all disorders are overcome with more difficulty, injuries are healed with less ease, and sometimes they break out afresh, after they have been once cured.

In these and in similar cases, the production of vital force is gradually diminished, or the expenditure of power is gradually increased; and, in either way, it is manifest that the tone of the constitution is lowered.

In all these cases, the effect corresponds to the cause. They hold an exact relation to each other, but no relation to the amount of vitality with which they are connected. As the removal of the first grain of sand from a mountain diminishes, by so much, the weight of the immeasurable mass, as certainly as it would diminish the weight of the tiniest mole-hill, so the first slight error in diet of

the robust man overtasked his digestive powers, the first hour's excess of toil overtaxed the strength of the stout farmer, the first hour's study by the midnight lamp impaired the health of the vigorous student, the first privation of the accustomed and needful sleep reduced the vital energies of the buoyant youth, and the first respiration of vitiated air failed in some degree to remove the waste from the blood — all these errors, so slight, perhaps, that they were not noticed nor deemed worth considering in comparison with the power of endurance, yet all were followed by their natural and proportionate consequences of evil, as certainly as the last in the series, which was followed by gastrodynia, debility, headache, or languor.

In these and all other errors in the management of the human constitution, there is, from the beginning, a departure from the original standard of health, by degrees so small, and by processes so slow, that their measure is rather to be calculated than determined by observation; and it is only after a long series of these departing steps, when their effects on the body have accumulated, that they can be recognized. But the very first step in this wayward course, though infinitely small, was, to that extent, disease, disorder, or debility, certainly a failure of the fulness of life.

There is in man a large vital capital to be expended, a large power of endurance that may be exhausted in wrong management; and, therefore, he does not regard his errors, nor perceive his losses. But all

undue expenditure is none the less a loss, and all endurance is weakening; and the day of reckoning and suffering, sooner or later, inevitably comes. The consequences grow out of and hang upon the causes, and they cannot be separated.

It is plain, then, that the separation of perfect health from acknowledged sickness is not by a distinct and narrow line, on one side of which, all is soundness, and on the other, indisputable disease. But, between perfect health—as good as the original constitution admits—and recognized disease, there is a wide space, a sort of neutral or disputed ground occupied in part by both, and exclusively claimed by neither.

GREAT DIFFERENCES IN VITAL FORCE.

The result of all this variety of organization, development, and self-management, is, that between the strongest and the weakest man, both in the enjoyment of their average, or what they call good health, there is an interval almost as wide as that between life and death; and, in this wide space, there is every grade of power in which men live and enjoy all that they suppose is allotted to them. Whatever the grade may be, in which any one stands, that is his own standard of health, in which he hopes to sustain himself, and thinks himself sick, only when he falls below it.

It must be obvious, that these standards of health and of constitutional power have a very wide range, and that among them there are very various amounts

of vital capital. Between the house-bred, inactive lady, whose muscles are small and soft, and to whom all exercise is an exhausting burden, and the robust laborer, whose stout frame and large limbs are covered with well-developed and hard muscles — between the pale and languid student, whose appetite is small, and digestive power less, and the hardy sailor, who eats and digests large quantities of the most concentrated and stimulating food — between the uneducated recluse, to whose sluggish brain thought is a burden, and mental labor painful, and the man of strong and cultivated mind, to whose brain all mental labor is but child's play — between the timid, doubting, desponding, and anxious, and the bold, decided, hopeful, and buoyant — between one and the other of these, there is an immense difference in the power and the energy, the availability and the enjoyment of life; and, if all the stronger and higher qualities are united in the one, and all the weaker and lower qualities in the other, the difference is immeasurably increased. And yet both may be in their usual health, enjoying, as it may seem to them, all that their constitutions and their temperaments allow to them, and no more. The one is not in any unnatural state of exaltation, nor is the other in any unnatural state of depression.

SICKNESS.

Notwithstanding persons, who have these different degrees of vital force, suppose themselves to be well, yet the depressing causes which have produced

these differences frequently continue their wasting work, and produce disease; or, they often act as predisposing causes, and prepare the system for the action of other and exciting causes, which produce specific disease. Consequently, we find sickness of various kinds and degrees; and this is most frequent among the poor who must endure privations, among the weak and foolish who mismanage themselves, and among the wicked who abuse themselves. We have no means of certainly knowing how much sickness there is in any community. The Health Insurance and the Benefit Societies have done the most to explain this matter;¹ but as yet they have not had sufficient opportunities of varied observation to determine the amount of disease in all the classes of people, and in all countries.

Some of the best authorities on this subject suppose that for every person that dies, there are two constantly sick; that is, for every death there are seven hundred and thirty days of sickness; and where the deaths are two or three per cent. of the living population, the individuals of that people will have, on an average, two or three weeks² of sickness in each year.

The report made by Mr. Finlaison to the British Parliament, respecting the amount of sickness, shows that, among the industrious poor who are members of the Benefit Societies in London,

¹ See Note A, Appendix.

² 14.6 or 21.9 days.

There are constantly sick, among 1,000,000 of males,¹ —

At the age of 23,	19,410	At the age of 53,	27,060
" " " " 28,	19,670	" " " " 58,	36,980
" " " " 33,	19,400	" " " " 63,	57,000
" " " " 38,	23,370	" " " " 68,	108,040
" " " " 43,	26,260	" " " " 73,	317,230
" " " " 48,	26,140		

But these calculations include only those cases of sickness in which a person is precluded from attending to any of his ordinary concerns, and are, by no means, all the deductions that are made from the vital forces.²

Taking any one's own standard of usual health, there are very few, probably none, that do not, sometimes, and perhaps frequently, fall below it. All the short sicknesses of less than a week, all the little ailments—the headaches, the slight colds, the heaviness after a full meal, the languors after a late night spent in labor or pleasure, the fatigues after over-exertion—all these, and many others, are so many and so far deductions from vitality; and, in each one of them, the total sum of life, its labors and its enjoyments, are, thereby and to that extent, diminished.

MORTALITY.

The same causes that open the way to, or produce, sickness, also diminish the recuperative energy, or the power of resisting its effects. Hence, wherever the most disease prevails, there is the most mortal-

¹ T. Southwood Smith. *Philosophy of Health*, vol. i., p. 123.

² See Note B, Appendix.

ity: and, in those classes and countries where the vital forces are the most depressed, there is the most frequent death and the shortest duration of life.

These are matters of record and calculation, in regard to some countries, and also, to some extent, in regard to various classes of people. These records and calculations show great differences of longevity among different people. The observations and calculations of the Life Insurance companies afford the best data for determining the value of life, and for comparing its duration in one country or class with that in another.

According to these calculations, the expectation of life, or the average duration of all, was —

Age.	England. ¹	Sweden. ²	Austria. ³	France. ⁴	Manchester, Eng. ⁵
At Birth.	41 years.	34 years.	29 years.	28 years.	24.2 years.
" 20 years.	40 "	38 "	36 "	34 "	33.3 "
" 60 "	14 "	12 "	13 "	11 "	10.3 "

Of 10,000 children, at 10 years of age, there will die,⁶ in

	New England.	England.	France.	Holland.
Before their 16th year.	300	322	364	436
" " 41st "	2228	2692	2614	3341
" " 71st "	6725	7077	6989	7263

and —

3275	2923	3011	2737
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will survive their 70th year.

¹ English Life Table for 1841. Fifth Annual Report of the Registrar-General, p. 367.

² Nicander, quoted by Milne, on Annuities.

³ Sixth Report of the Registrar General, p. 347.

⁴ Duvillard, quoted by Milne, on Annuities, p. 548.

⁵ Registrar-General's Seventh Report, p. 338.

⁶ Tables prepared by James Hayward, for the N. E. Life Insurance Company.

The observations and calculations of the Life Insurance companies are limited to a few countries, and generally include only the better classes of people; at least, the poorest and the lowest are but rarely the subjects of their observation.

The average age at death, and the ratio of deaths to the numbers of the living, as means of estimating the force of mortality in any class or country, or as grounds of comparing the mortality of one place or class with that of another, are liable to some objections, because they necessarily bear some relation to the composition of the population, which differs in various countries and classes of people. All inferences, therefore, drawn from these data, must be admitted with some qualification.¹ Nevertheless, both of these data will afford some indication of the value of life, in any community, and lead to some approximation of the comparative value in different communities.

The average age of the dying ¹ was, in

England and Wales,	29.64 yrs.	Russia, ⁶ (males,)	19.88 yrs.
Prussia, ²	27.77 "	Martinique, ⁷	41 "
Sweden, ³	27 "	Massachusetts, ⁸ (1842 to 1848,)	29.11 "
Austria, ⁴	23 "	Middlesex Co., ⁸ Mass., (1842,	
Ireland, ⁵	28 "	'43, '44, '45,)	28.19 "

¹ See Note C, Appendix.

² Calculated from London Statistical Society's Reports, vol. ii., p. 364.

³ Milne on Annuities, p. 534.

⁴ Sixth Report Registrar-General of England, p. 347.

⁵ Mr. Chadwick. Interment in Towns, p. 250.

⁶ Calculated from a Statement of the Mortality of Males in Russia, in "Journal des Travaux de la Société Française de Statistique Universelle," tome iii., p. 352.

⁷ Annales D'Hygiène, xviii., p. 271.

⁸ Calculated from the Annual Reports of Births, Marriages and Deaths.

Franklin Co., ¹ Mass., (1842, '43, '44, 45,)	37.64 yrs.	Plympton, ³ Mass., (1812 to 1845,)	41.4 yrs.
Concord, ² Mass.,	38.95 yrs.	Dorchester, ⁴ Mass.,	32.5 "

The proportion of deaths to the living population was, in ⁵

Norway, ⁶	one in 50.8	Roman States, ⁷ (1829,)	one in 28
England, ⁶	" " 45.6	Russia, ⁶ in the basins of the	
France, ⁶	" " 40	Dnieper, Don, and Wolga, " " 23 to 18	
Holland, ⁷	" " 40	Northern Russia, ⁶	" " 33
Upper and Lower Austria, ⁶	" " 33	Maranham, S. A., ⁸	" " 25

Comparing the open country with cities, we find still greater differences, and that vital force diminishes, and the force of mortality increases, generally, with the density of population.

The average age at death, was, in

Massachusetts, (not including Boston), 1842 to 1848,	31 years.
Boston, 1842 to 1848,	21.64 "
England,	29.64 "
London,	27 "

¹ Calculated from the Annual Reports of Births, Marriages, and Deaths.

The Registration Reports of Massachusetts have been published seven years, and contain very important facts and deductions. Yet they fall very far short of what they should be; and the late reports are much less valuable than the early ones. The average age is stated in only two of the reports. The statements here made are approximations by calculation. Some important tables, which were in the reports previous to 1847, are not in the reports of 1847 and 1848. Neither the ages nor the causes of death, in reference to counties, are stated in the two last reports; and no means are given of comparing the mortality, longevity, or causes of death, in various sections of the State. It is to be hoped that, under the new law, more efficient service will be applied to this work, and the reports will take a new form, and give to science all the aid that the constantly accumulating facts will enable them to offer.

² Calculated from Bills of Mortality, from Nov. 17, 1778, to May 13, 1848.

³ Lewis Bradford. Town Clerk's Report, in the Fourth Mass. Registration Report.

⁴ Calculated from the Town Clerk's Records, 1817 to 1843.

⁵ See Note D, Appendix.

⁶ Calculated from Tables in Sixth Report of the Registrar-General of England.

⁷ Pritchard's Natural History of Man.

⁸ Tables of Commerce, Revenue, &c. of the United Kingdom, for 1834, Parliamentary Report, folio, Part iv., p. 454.

The ratio of deaths to population was, in

London, ¹	one in 39	Belgium, (towns) ²	one in 36.9
Surry, ¹	" " 55	City of St. Petersburg, ¹	" " 37
Lancashire and Cheshire, ¹	" " 38	Province of do. ¹	" " 24
Liverpool, ¹	" " 33	Austria, ¹	" " 30
Sweden, (country), ¹	" " 44	Vienna, ¹	" " 21
" (towns), ¹	" " 28	France, ¹	" " 39.9
Belgium, (country) ²	" " 46.9	Paris, (Dep't of Seine), ¹	" " 33

The same difference in mortality is shown in different parts of the same city. In the six most healthy registration districts of London, with a population of 261,728, the deaths, in 1839, were one in 41.7, at the average age of 32.81 years; while in the five worst districts, with a population of 238,518, the deaths were one in 39.72, at the average age of 22.04 years. The deaths of children, under ten years of age, were, in the best districts, 34 per cent., and in the worst districts, 56 per cent. of the whole.³

This difference of mortality is connected with, and, probably, in part owing to, the differences of circumstances and of domestic condition. In another classification, which included in one class the wide, well paved and drained streets, and good houses, inhabited principally by the prosperous, and, in another class, the narrow, badly paved and drained streets, and small and crowded houses, occupied principally by the poor—each class containing the same population—while only 315 died in the best, 613 died in the worst, streets and houses.

¹ Calculated from Tables in Sixth Rep. Reg. Gen. ² Quetelet on Man, chap. v.

³ See Note E, Appendix.

Villermé says, that the mortality of the indigent class is, in some places in France, just double of that of the wealthy. "Taking together the whole of the French population, human life is protracted twelve years and a half, among the wealthy, beyond its duration among the poor.¹

Sickness and mortality seem to go hand in hand with poverty. The want of intelligence and skill in self-management accompany the want of pecuniary means to procure the comforts and even the necessities of life. Poverty refers to vitality, and to bodily and mental health, as well as to estate.

The Secretary of the English Poor Laws Commissioners classified the persons who died in several towns and places, according to their occupations, and domestic conditions; and the result² was, that in the families of the

Prosperous,	1088	died at an average of	42.6	years.
Middling Classes,	4791	" " "	29	"
Poor,	19,849	" " "	20.4	"

In the families of the prosperous, 20 per cent., and in the families of the poor, 50 per cent., of the deaths were under 5 years of age.

In the prosperous, 28 per cent., and in the poor, 66 per cent., died under 40.

¹ T. Southwood Smith. *Philosophy of Health*, vol. i., p. 108.

² Condensed from pages 153 to 161 of the General Report on the Sanitary Condition of the Laboring Classes of Great Britain, by Edwin Chadwick, Esq. These classes are thus described:—"1. Professional persons and Gentry, and their families. 2. Tradesmen, Farmers, and their families. 3. Mechanics, Operatives, Laborers, Servants, and their families."

Among the prosperous, 46 per cent., and among the poor, only 8 per cent., survived their 60th year.

These statements are corroborated by the reports of Villermé, in France, and by some few partial inquiries made in this country. According to Mr. Shattuck's report on the census of Boston, the average age of those who were buried in the Catholic cemetery, at South Boston, 1836 to 1845, including principally the poor foreigners, from the most crowded parts of the city, was only 13.49¹ years, while the average for the whole city was 21.64 years.²

Thus we see that man's length of life, instead of being continued to his fulness of years—three score and ten—is, in the most favored country, less than half, and, in some, less than one third, and in some classes less than one quarter, of what is supposed to be the natural longevity. England, and the rural part of Massachusetts, are among the most favored countries in this respect; and yet, in Massachusetts 40 per cent., and in England 47 per cent., die while they are going through the process of development, and before they enter upon self-sustaining life, in their 16th year. In Massachusetts only 16 per cent., and in England only 14 per cent., of those who died had fulfilled the natural destiny, and passed their 70th year.

To these deductions or losses of life by premature death, must be added the losses by sickness, little ailments, and want of fulness of power, and it is

¹ Census of Boston, p. 157.

² Calculated from Bills of Mortality.

plain that mankind fall very far short of that completeness of life which it is supposed that they have the means of enjoying on earth.

CAUSES OF THE DIFFERENCES OF VITALITY.

It is, then, a matter of the utmost interest, to know, why mankind suffer these losses of life, and whether they are necessary conditions of their being here.

Much of the difference of vitality is owing to difference of organization — much to development — but much more to self-management. The last is certainly within the control of man himself; the second is within the control of his parents; and the first is more under the control of the world than they are now willing to admit. Why, then, does not man avail himself of these means of life, and create for himself, or his children, the highest health?

There is a general ignorance of the laws of vitality. Men do not understand the connection between their conduct and vital force; and they feel but little responsibility for the maintenance of health. They lay their plans and carry on their operations, without much regard to the conditions of their existence. Life and its interests are not always paramount considerations; but they are made subordinate to matters of inferior importance. They are sacrificed or made to yield to common conveniences and concerns: a man postpones his regular meal, or perhaps goes without it, for want of time

to attend to it; or, he eats too much, in order to gratify his appetite, or perhaps to please his friends; he exposes himself to inclement weather — cold, storms, and heats — in pursuit of pecuniary profit; he fashions and wears his clothing, not according to the necessities of his temperature, but according to the varying taste of the world; he works late at night, or early in the morning, and expends in the day more vital force than the night brings back to him; or, he devotes some of the hours needed for sleep to pleasure, or to the calls of charity.

In the management of the organs and powers, the question, generally, is not — What does life require, for the development and maintenance of its fullest power? but — What will it bear without extinction? Doubtful questions are determined against life, which must bear the risk of the loss. As an imprudent merchant looks only to the possible chance of escape from bankruptcy, when he considers his expenditures and burdens, and expends or assumes whatever he thinks will not break him, although, to its extent, it is a tax upon his capital; so, unwary men look upon life as a sort of integer, which, whether complete or impaired, seems to be all the same — and, in considering burdens and expenditures, they ask — not, whether they will expand life, but — whether life can bear them without utterly failing.

The safety of using *alcoholic* drink is yet an unsettled question. Few suppose that it is ever beneficial to men in complete health: the only question

is, whether it is injurious or not. But, notwithstanding there is no doubt that it is not beneficial, and there is a doubt as to its harmlessness, the world is waiting for this last doubt to be removed, and for the positive proof that, in all cases, it produces injury, before they are willing to banish it utterly from use.

Tobacco comes under the same category. It does no good to men in health. Life is neither energized, nor exalted, nor prolonged by it. Its effects are, at best, but negative; and, to some, it is, in a greater or less degree, injurious. Certainly it is reasonable to suppose, that the mixture of so strong a narcotic as tobacco juice with the gastric fluid must change its character, and probably weaken its solvent powers; and the mingling the smoke of tobacco with the pure air must interfere with the chemico-vital processes in the lungs, by which the venous is changed into arterial blood.¹ In either case, the nervous system is unnaturally affected by it; and yet, because this is not demonstrated, the doubt is usually settled in favor of the use of tobacco.

Even more than this, the tobacco-smoker not only continues to experiment on his own vital forces, but he compels others, however unwilling or however unable they may be, or however much they may suffer by it, to try the same experiment on theirs. A man compels his family in his own house, some travellers, boarders in hotels compel the other occupants of the public rooms, and passengers in

¹ See Note F, Appendix.

the streets compel others in their vicinity, to inhale their tobacco smoke. Any one, who desires it, takes this liberty of forcing others to join with him, by vitiating their atmosphere, which, it seems, was given to man in a state of purity, that all might have the privilege of breathing it in the condition that would most effectually serve the purposes of life.

There is a law in this city, prohibiting the smoking of cigars in the streets; but this law is made, not for the security of man, but for the security of buildings. It is intended merely for the prevention of fires, not for the preservation of the purity of the air. It is not even in the chapter relating to public health, but in that which relates to the fire department.¹

These, and other common and familiar customs, show how little the principles of vitality, or the care for life, weigh upon the anxieties of the world, and how far these are from being paramount considerations in the general plans of action.

The tenor of early education, the influence of public opinion, and the example of general habits, give men wrong notions of the value, the uses, and the purposes of life and its elements. The world talks much of the sacredness of life, and allows no man to extinguish it in himself or others. Suicide and murder are too shocking to be tolerated. But

¹ City Ordinances of Boston, page 111. "An Act to secure the Town of Boston from damage by fire." § 10. "Every person who shall smoke or have in his or her possession, any lighted pipe or cigar, in any street, lane, or passage-way, or on any wharf, in said town, shall forfeit and pay for each and every offence the sum of two dollars."

the foundation on which life is established, the organs and means by which it is sustained, the powers and faculties which are its products, and the labors and enjoyments which are its objects, have no such sacredness attached to them. These may be expended or wasted, and life thereby diminished, or even ultimately extinguished—and thus partial murder or partial suicide may be committed—and no law of authority prohibits it, no public opinion is disturbed by it.

A man does not this voluntarily; but he deliberately lays his plans, and pursues his course, by which these consequences are inevitably produced. He indulges his appetites and passions beyond their proper limit, he works too laboriously with his hands or his brain, he deprives himself of sleep, he engages in an unhealthful occupation, or establishes himself in an unhealthful climate or miasmatic country, and thus he reduces his vital forces, and partially destroys life, or entirely wastes it away.

The common sense of mankind is not shocked by these things; on the contrary, a willingness to incur the partial loss of life, and run the risk of its entire loss, is esteemed, with some, a sort of virtue; while the cautious guarding the integrity of life is deemed reproachable.

COMPARATIVE CARE FOR LIFE AND PROPERTY.

The care with which mankind guard the interests of property, the pains they take in every way to increase it, and the anxious attention to prevent its loss, compared with the devotion to the interests of

life for the same purposes, show that property is a primary, and life a secondary object.

The improvements that relate to life are few, and when they are made, they make but slow advancement in popular estimation and use. But the improvements that relate to the facilities or profits of business are manifold, and quickly find their way to the confidence and adoption of the people.

Although air-tight stoves were injurious to life, by stopping the chimney ventilation, yet, inasmuch as they lessened the consumption of fuel, they were at once adopted, and they were used throughout the country very soon after their invention. The improvements in tools, in like manner, are taken into general favor. But the means of artificial ventilation, which have been long before the public—some of them almost a century—are rarely used, except in some public buildings, and in the dwellings of the few who care the most for these matters—and these few are mostly confined to this and other cities and their neighborhoods. And this means of supplying the needful air to inhabited rooms is so far from being in general use, that most men, if they think at all of these things, consider them as only needless luxuries to be enjoyed by the wealthy and the self-indulgent, but by no means necessary for the security of life.

The same inference may be drawn from the comparative care which we bestow on the means of sustaining life, and upon the management of our ordinary affairs. Our digestion and nutrition depend very much upon the kind of food which we eat, or

the material that is to be converted into flesh. It would seem, then, that those who provide and prepare our food should understand its nature, and the effect of the various methods of cookery upon its digestibility and nutritiousness; and that they should carry on their culinary processes with such discipline, that they could not fail of producing that aliment which is best fitted to nourish the living body, and which will produce the greatest amount of vital force. With these means, success in culinary operations may be as certain as in those of the mechanic arts.

But so far is the general practice from this, that those who are entrusted with the preparation of our food are usually the least educated; most of them are ignorant of the principles of their art, and some of them incapable of conducting any series of operations with exactness and certainty to a definite conclusion. Consequently their work is uncertain, and it is but an accident that their results are satisfactory. Hence, luck and chance too often govern the preparation of food; and, in this matter of vital importance, people submit to that degree of unskillfulness and uncertainty that they would not in ordinary affairs. Hence, we are sometimes told, as if it were fair philosophy or inevitable necessity, that the cook was lucky with the bread when it is good, and unlucky when it is bad. This explanation is often received as satisfactory, and thus life is lucky or unlucky, with its chance of energizing or depressing sustenance.

But these loose principles of action are not ad-

mitted in regard to common arts. The world is not satisfied with the joiner, who says he was unlucky when he made his door of a different size from his passage-way ; nor does it sympathize with the painter or dyer, who deems himself lucky when he produces the intended colors by his mixtures. In these and other common matters, the world not only understands the value of correct principles and certainty of action, but it demands and obtains them. Yet it needs no philosophy to tell, that the preparation of materials that are to be converted into living flesh, and the adaptation of these to the powers of the stomach and the wants of the body, are matters that require more skill than any processes in the chemical or mechanic arts.

These and all other means and ways of producing and expending vital force are submitted to man himself for direction and use, to gain from them the highest or any lower degree of life, and there is no natural or insurmountable obstacle to their best improvement.

But there are intellectual and moral obstacles to this advancement, in the general ignorance of the laws of life, and of the connection of self-management with health, and of the origin of disease, in the misapplication of the religious element, by which sickness is referred to the direct and unaccountable interposition of a mysterious Providence, and not to man's violation of the laws established by the all-wise Creator for his conduct in all the minutia of his life—and in that sullen fatalism that refers sickness to some irresistible necessity. There are obsta-

cles in man's foolish selfishness which seeks present and temporary gratification in over-indulgence of passion and appetite at the expense of future and lasting pleasure, and in the unwillingness to conform his plans of action to the vital requirements. Even these obstacles may be overcome by man.

INFLUENCE OF PARENTAGE ON THE CONSTITUTION.
MARRIAGE.

But the difficulties that arise out of defects of organization, seem beyond the reach of human power to prevent; for, as the children's constitutions are primarily formed in the likeness of those of the parents, the hereditary strength or weakness must be traced back to the marriage relation for its cause. There it may not be possible to interfere. It is apparent that we cannot apply some of the means for the improvement of the human race that we do for the improvement of the lower animals and vegetables, by the selection of parentage.

The sensibilities of society would revolt at the thought, that only the healthy should marry. Mankind love to cherish some peculiarly holy and delicate notions in respect to marriage; the tenderest feelings of the heart, and the uncalculating affections, seem exclusively to be considered. People seem to marry for their own happiness alone, and cast no look beyond themselves. Yet other considerations are sometimes admitted. None can be blind to the future fact, that from this institution another generation shall spring; and, although these future events are forbidden subjects of discussion with

those who are most interested, and even all allusion to them in their presence is studiously avoided, yet, in reference to pecuniary matters, the probability of issue is occasionally considered. Some cautious women, in order to prevent the loss of their own estates, in the chances of their prospective husband's affairs, secure it before marriage to themselves and their issue. And some prudent persons, before contracting marriage, would consider it unwise to neglect to ascertain, whether the proposed partner had merely a life right in an estate in possession, or whether the estate was held in fee simple and would descend to the possessor's children. And so men and women do not hesitate to look at the probability of offspring when money is concerned, and to provide in the advance for the security and sufficiency of their estates.

If the world could be convinced, that health and strength descend from parents to children as certainly as property, and that the laws of man cannot guarantee to the future offspring the possession of estates that now belong to the contracting and marrying parties, as effectually as the laws of nature guarantee that their organization, and the physical, mental, and moral qualities, that grow out of it, shall descend to their issue; if this law of hereditary life could be as generally understood as the law of hereditary property, then men and women, in their matrimonial selections, would take into consideration the constitution and health of their proposed partners. And those, who now think it wise to ascertain whether wealth or poverty shall be entailed

upon their children, would think it still more wise to ascertain, whether a sound constitution, or insanity, epilepsy, consumption, scrofula, rheumatism, or any other disease, shall be their children's inheritance. Certainly no prudent man or woman can know that any one of these diseases, or that defect of organization which creates a susceptibility of any of them, belongs to the proposed husband or wife, without shrinking from the connection that would entail it upon their own children.¹

It is an essential element of our highest benevolence and cultivation to arrange all our plans of action in such a way that they will secure the greatest good, not only for the present time and for ourselves, but for the future and for all others that may be affected by them, however remotely. On this principle, wise and generous men and women, when they form their matrimonial plans, will look, not merely for those qualities of mind and heart that will give the greatest present enjoyment to themselves, but for all those qualities that will secure the greatest and most permanent enjoyment to their children and their remotest posterity.

For this purpose, it is necessary to learn, first, the law of hereditary descent, and, next, the facts in regard to the hereditary or acquired constitution, the present health, and the purity or impurity of the blood of those who are candidates for matrimony. When used for this object, the study of even "endless genealogies" will be profitable; not for the

¹ See Note G, Appendix.

mere purpose of finding a series of names that represent a succession of generations, nor of tracing out some root of external honor, but to determine through whose veins the blood has flown from even remote ancestors to the present generation.

In this view, the *registration of births, marriages and deaths*, becomes of great value, for it will show from whom any one is descended, what families have connected themselves with his family, who have contributed the elements of their life to the formation of his life, whether any taint has crept through any of these channels into his blood, and what fatal diseases have been in his family.

Although, by means of the registry of deeds, we can trace our estates through the successive owners to the first one who appropriated them, yet we have no vital registry that extends backward through a single generation. But when these records of life and death shall be more complete, and the world comes to understand its true interest, men will consult them to ascertain the purity or impurity of the blood of families before they enter upon a matrimonial connection, as they now consult the registry of deeds to ascertain the clearness or defect of the title to estates, that have passed through several hands, before they purchase them.

There is a large moneyed institution in Boston which insures lives, and also loans money on the mortgage of real estate. With a wise caution, the directors receive no mortgage unless it is shown, by the public records, that there neither is nor has been any defect in the title to the estate, as it passed

through successive owners, from the earliest known possessor. But they insure lives without any such means of knowing, whether there may not have been some taint, consumption, epilepsy, scrofula, or other hereditary disease, in some of the predecessors of the insured, whereby he has a defective title to his life.

VITAL FORCE OF ANIMALS AND VEGETABLES INCREASED.

To all these matters the world will gradually turn its attention, and ultimately learn the way of enlarging human life, as they have already learned the way of enlarging property. What they have already tried with success in one field, they will try in another and richer one. Everywhere, men of high intelligence and practical habits devote time and talent to the study of the laws of nature, in order to expand the life of vegetables and of domestic animals.

By carefully observing the laws and requirements of its life, and adapting the soil, situation, exposure, nutriment, and all the circumstances of its being to its wants, and thus giving its vital principle the best means and opportunities of action, they have converted the small, bitter, indigestible and innutritious crab, into hundreds of varieties of large, delicious, digestible, and nutritious apples. By the same faithfulness to the conditions of their being, they have raised the wild sloe to the present rich variety of plums, and expanded the pear and multiplied it into almost a thousand kinds. In the same

manner, they have enlarged the vitality of other fruits, and of roots and grains, and made them manifold richer in all qualities of their respective lives, than they were before the skilful hand of man fed their wants.

So also flowers, which would seem to be the peculiar and perfect gifts of nature, have grown more luxuriantly, and become richer in living beauty, by the fostering hand of man.

By applying the same principles, men have multiplied and extended the living power and the qualities of cattle, sheep, swine, and other animals, to which they have thought it worth their while to devote their careful attention.

In making all these improvements, there has been no change in the laws of life; these remain universally the same as they were in the beginning. But, having learned these laws, in respect to these animals and vegetables, men have so arranged their circumstances, that they may have the best opportunities and means of development and growth, and thereby their vital forces have been increased, and all the desirable results of their life have been enlarged.

Associations of men have brought their united strength to aid in this work of vital improvement, governments have lent their influence and their treasuries to encourage it, by liberally rewarding those who have expanded the life of animals and vegetables.¹

¹ See Note H, Appendix.

VITAL FORCE OF MAN MAY BE INCREASED.

The laws of human life, also, are fixed and unalterable; but the circumstances amidst which those laws operate, the means by which that life is sustained, and the purposes to which its results are devoted, are various. They all affect very materially the quantity of vital force, and they are subject to human control.

Connected with the best circumstances and habits, life is the fullest, longest and happiest; and with the worst, it is the shortest, most meagre and wretched. But man is not placed in the lower condition by any inflexible law of his being, nor will any unconquerable necessity compel him to remain there through successive generations. In order to rise from the lower to the higher state, it is not necessary that there should be any alteration in the course of Providence, nor that man should be endowed with any new faculty or have any new field of action. It only requires that he should conform his plans and habits to those laws, which from the beginning have been established for his earthly being, and that he devote to this purpose the talents and the energies which he has already successfully devoted to the elevation and enlargement of animal and vegetable life, and then he may be confident of similar success in his own vitality.

As the world comes to care for these things, and to be willing to transfer their talents and energies for improvement from the lower to the higher field of life, they will want aid and instruction; for, when the facts are doubtful, or the application of

the principles uncertain, they will need competent men to investigate these matters and explain them, and will be as ready to reward the talent or the skill that saves them from deterioration or elevates their standard of life, as they now are to reward that which restores them their lost health and strength. And, as in the legal profession, no small proportion of the learning is occupied in advising men how they may conform themselves strictly to the requirements of the law, and thus save themselves from difficulties and losses, so, gradually, such a preventive branch of our profession may arise and find employment.

Even now such is occasionally demanded. Not long since, a cautious gentleman receiving a matrimonial proposition for his daughter, consulted a physician as to the propriety of the marriage. The proposed husband was a man of nervous temperament; his grandmother, his mother, and an aunt and cousin on her side, and a brother, all had been, or were then, insane. His friends thought him to be sound in mind, and secure from mental disorder; nevertheless, the physician thought there was some danger of his becoming insane, and a greater danger of transmitting the taint to his children. He therefore advised that the proposal be rejected. His advice was followed. Another, and somewhat similar case, was recently presented to the same physician, and a written opinion with the reasons requested. The same advice was given, but not followed.

In 1840, a gentleman fearing he had tubercles in

his lungs, asked the advice of his physician respecting the propriety of fulfilling a contract for marriage. The tuberculous condition was not very manifest, and there was some hope that his health might be invigorated, and at least that his children might not receive the taint, and he was advised to marry. In the course of six years he died of phthisis. In the mean time two children were born. One of these has died of tubercular disease, and the other very narrowly escaped death from pulmonary disorder, and is now very feeble, and probably has tubercles.

Consultations like these, and also in regard to other matters of a prophylactic nature, occur now and then. They ought to be, and, in course of time, they will be general, and we and our successors will have more and more opportunities of teaching the world the law of physical life.

In our teaching, and in the world's learning, there is every thing to gain and nothing to lose. Although a man cannot "by taking thought" alone, "add a cubit to his stature," yet, by careful observance of all the laws of his being, he may add a degree to his strength, an increase to his vital force, and days, perhaps years, to his longevity. How much of this expansion of life we may accomplish, or how many ages it will take for mankind to attain to its fullest measure of vitality, in duration, in power, and in enjoyment, we cannot tell, nor is it necessary for our present purpose that we should know. But, we may be assured, that, if in this matter we are faithful to the responsibilities that come upon us, from our edu-

cation, our opportunities, and our influence, we shall not only increase and prolong our own vital forces and actions, but guide others to make the same vital improvement, and then, dying, we shall have the satisfaction of leaving the world richer in all the blessings of earthly life than we found it.¹

¹ See Note I, Appendix.

OBITUARY.

WITHIN the last year seventeen members of this Society are known to have died.

Admitted to the Med. Society.		Residence.	Age.
1785	OLIVER PARTRIDGE,	Stockbridge,	97
1800	CHARLES L. SEEGUR,	Northampton,	86
1803	JONATHAN LEONARD,	Sandwich,	86
1803	NATHAN HAYWARD,	Plymouth,	85
1810	STEPHEN BATCHELLER,	Royalston,	78
1808	AMOS BANCROFT,	Groton,	77
1817	ENOCH HALE,	Boston,	58
1827	EZRA NICHOLS,	Newton,	58
1829	JOHN SEABURY,	Sturbridge,	57
1833	LEROY M. YALE,	Tisbury,	46
1836	THOMAS GRAY, JR.,	Boston,	46
1840	WOLCOTT C. CHANDLER,	Natick,	41
1846	SAMUEL HAMLIN,	Boston,	33
1843	HORATIO C. MORSE,	Roxbury,	29
1845	JOHN B. WALKER,	Boston,	28
1845	FREDERICK HOWES, JR.,	Salem,	25
1836	DANIEL W. DAVIS,	West Barnstable.	

Six of these deceased members were among the patriarchs of our profession, and they died in the fulness of their years. The others died in the midst of their usefulness, upon which some of them had but recently entered, and all of them left unfulfilled the hope that mankind would yet receive great benefit from their labors.

DR. OLIVER PARTRIDGE was born in Hatfield, in 1751, and removed to Stockbridge in 1771. He

began the active practice of his profession in 1773, and died in July, 1848. He had lived in one house 77 years, and had been in the profession 75 years. Throughout this long period he was engaged in the study and pursuit of medicine. He was a careful observer of nature, a student of botany, and interested in the study of the medicinal plants of this country. He even engaged in a public discussion of the merits of some of our indigenous plants with Dr. Thatcher, of Plymouth, after they were both past the age of fourscore. And even when he was more than 95 years old, he corresponded with an eminent physician concerning a case of some doubt. His mind held out to the last. "Only four weeks before his death, his deposition was taken by one of our lawyers, and his memory was so accurate that he would not sign it until it was altered to conform exactly to what he had told the party some months previous."¹ Thus with quiet diligence he passed more than three quarters of a century in the care of disease and the study of natural history, possessing always the love and confidence of his fellow-men, and then he died after having enjoyed more happiness than falls to the common lot of man.

DR. JONATHAN LEONARD died, in January last, after having been engaged in his profession almost 60 years. During his life of more than fourscore years, he had ever shown himself an honest and a kind-hearted man; he was faithful to his profes-

¹ Dr. Stephen W. Williams, in *Boston Medical and Surg. Journal*, vol. xxxix., p. 123.

sional responsibilities, and an honor to his vocation. He was kind and gentle to all who had intercourse with him, and highly beloved and respected by his people.

He became a member of this Society at an early period, and continued its unfaltering friend to the day of his death. He took great interest in education and in every thing that would elevate the condition of his fellow-men. He had very active and generous sympathies and delicate tastes, and manifested them in his regard for the poor and distressed, in his love of animals, and in fondness for botany and horticulture. He retained his interest in these even to his extreme age, and thus he kept his heart young while decrepitude was creeping over his frame. After a long life of active usefulness in his profession and in society, he died in the love and the confidence of those who knew him.

DR. STEPHEN BATCHELLER was the son of Dr. Stephen Batcheller, of Royalston. He first engaged in the practice of medicine in Truro, in 1800 — but in 1803, he removed to Royalston, where he continued in active professional employment to the day and almost to the hour of his death, on the 7th of November, 1848. "The father and the son successively practised in this town for the long period of 80 years." "As a physician, Dr. Batcheller certainly held a high and very respectable rank, and was greatly esteemed by his professional brethren." "He had probably for many years a more extensive consultation business than any other physician in

the county of Worcester, and perhaps in the State."¹ He was an exemplification of the great physical labor which is required of some country physicians in extensive practice. He lived in the midst of a very hilly and somewhat mountainous region, and was called to visit his own and others' patients on every side, far and near. "He was notorious for the rapidity of his travelling. Keeping the best horses, he often travelled seventy miles a day and visited his patients."² This laborious employment left him, in some seasons, very little time for rest, and none for study. Yet, at other seasons, he found time for study, and read most of the new medical works. He had many medical students, and he was very much called upon to attend to the affairs of the town, and to the service of the widow and the orphan, who always found in him a ready and an efficient and a generous friend.

"He was one of the most punctual attendants of the meetings of this Society. Although residing seventy miles or more from Boston, he often rode from Royalston thither in his gig to attend this meeting, the day before its assemblage, and returned home the day after in the same way. He held the office of Counsellor in the Society for a great many years in succession, and for two years he held the office of Vice President in it."²

Dr. Batcheller lost no time in self-indulgence, or in sickness. He was a strong advocate of temperance

¹ Dr. Stephen W. Williams, in *Boston Medical and Surg. Journal*, vol. xxxix., p. 457.

² *Ibid.* p. 458.

and an indefatigable worker. "His active usefulness continued to the very end of life. He literally died in the harness. He practised in two adjacent towns on the day of his death. On his return, it being the day of the Presidential election, he deposited his vote for electors at the town house, and called on one of his neighbors, apparently well. As he sat at an innocent game of checkers with him, he leaned back in his chair, and observing that he felt faint, called for a glass of water; but before it could be handed to him, he was dead, probably from a fit of apoplexy."¹

DR. ENOCH HALE was too prominent a member of this association to be ever forgotten by those who met him here. The prosperity of this Society was dear to his heart, and he labored earnestly and successfully for its best interests. He was a strict constructionist of its constitution; but he strove to adapt its organization and laws to the wants and progressive nature of the profession.

He had the first requisite of a good physician — he was an honest man; there was ever in his mind that fair ingenuousness that seeks for truth alone, and is fearful of all error. He was a careful observer of events, a diligent student of books, and hence an accumulator of many facts. His mind was a rich storehouse of details, out of which he was able to draw wide inferences in regard to the nature of man. Meteorology was his especial favor-

¹ Dr. S. W. Williams, in *Boston Medical and Surgical Journal*, vol. xxxix., p. 460.

ite, and by his observations of the weather, cold, heat, winds, &c., in connection with health and disease, he endeavored to contribute to the advancement of medical science.

Dr. Hale was early distinguished as a scholar and a writer. Very soon after he began the practice of his profession, he wrote the "History of the Spotted Fever." In 1819 and 1821, he wrote two dissertations "On the communication between the Stomach and Urinary Organs," and "On the propriety of administering Medicine by Injection into the Veins." Each of these obtained the Boylston Prize. In 1839, he delivered the annual address before this Society, on the "Typhoid Fever of New England." Beside these, he was a liberal contributor to the *North American Review* and several *Medical Journals*.

In his intercourse with his patients, in private practice, and "at the hospital, he evinced, in a remarkable degree, that fidelity and tenderness of feeling which gained for him many friends, who regarded him with affection and respect."¹ In his intercourse with his professional brethren he showed himself a kind, a just and a learned member of the profession, and in general society he was a man of distinguished learning, of incorruptible honor, and untiring industry in the walks of usefulness.

DR. AMOS BANCROFT was a physician of high respectability, and enjoyed in a large degree the

¹ Report of the Trustees of the Massachusetts General Hospital for 1843, p. 5.

confidence of an extensive neighborhood. He was also engaged in the cultivation of the earth, and took great satisfaction in the success of his agricultural pursuits. Nevertheless, he was devoted to his profession, and continued in active practice in Groton and its vicinity until his health failed, a short period before his death. He was overthrown in State street, in Boston, in July, 1848, and died in a short time, at the house of a friend.

APPENDIX.

NOTE A.—(PAGE 15.)

"IN manhood, when one person in one hundred dies annually, two are constantly sick."¹

The following table is condensed from Ansell's table of the "mean quantity of sickness experienced by a person in the year following each age, expressed in weeks and decimals of a week."²

AGE.	WEEKS SICK.	AGE.	WEEKS SICK.
20 to 35	.826	69 to 76	13.062
36 to 44	1.029	77 to 80	25.556
45 to 52	1.722	81 to 85	10.387
53 to 60	2.700	86 to 92	34.772
61 to 68	7.193		

From 20 to 35, the amount of sickness does not vary very materially, being the lowest, 738, at 26, and the highest, 966, at 35. From this age it increases, and in the later periods of life very rapidly. It seems to be very small in the period from 81 to 85. This, however, may be due to the limited number of persons observed, which were healthier than the average at that age.

There are no data to determine the amount of sickness in New England. Some of the Health Insurance Companies here made up their rates of premiums according to those of the English

¹ Macculloch, Statistical Account of British Empire, vol. ii., p. 567.

² On Friendly Societies, p. 59.

Benefit Societies. But these have been found, on trial, too low. Probably there is more sickness here than in England, and some of these companies have been paying out in "benefits" more than they received in premiums. The Boston Journal of 30th July, 1849, says, "Yesterday the last of the four companies remaining in operation, chartered in 1847, viz., the Massachusetts Health Insurance Company, voted to discontinue farther business and close up its affairs. The 'Lowell' and 'Worcester' institutions decided on this course about a year ago. During the last six months, the Essex Company has been winding up and paying from 20 to 30 cents on a dollar."

The Siloam Lodge of Odd Fellows, in Boston, found the same result and difficulty, and lately voted not to pay for the first week of any case of sickness, but for all afterwards, and charge the same premiums as before.

The average number of the members of the Siloam Lodge for the years 1844, '45, '46 and '47, was 549. The average time of sickness of all in each year for which "benefit money" was paid, was 465½ weeks. Average sickness for each member drawing "benefit money," was 59 days in each year.

This agrees very nearly with the short experience of the United States Health Insurance Company.

The average amount of sickness is much greater among females than among males. The records of the Lancashire Factories show this fact. Among all the persons employed, the females had about fifty per cent. more sickness than the males, and at some periods, three times as much as the other sex.

Average days of Sickness among all employed in the Lancashire Factories.¹

AGE.	DAYS OF SICKNESS PER YR.		AGE.	DAYS OF SICKNESS PER YR.	
	Males.	Females.		Males.	Females.
Under 11	2.46	8.03	36 to 41	4.13	6.16
11 to 16	3.81	4.25	41 to 46	5.09	14.67
16 to 21	4.42	5.56	46 to 51	7.13	20.34
21 to 26	4.91	6.85	51 to 56	3.47	15.75
26 to 31	6.83	8.62	56 to 61	12.63	15.75
31 to 36	3.85	9.29			

¹ Maculloch's Statistical Account of the British Empire, vol. ii., p. 579.

Proportion of Sick out of 100 living at each Interval of Age.¹

Between Ages	SICK TIME IN 100 OF LIFE TIME.		Theoretical Table by Mr. Edmonds.
	Scotch Benefit So- cieties.	English Benefit So- cieties.	
20 to 30	1.14	1.54	1.72
30 to 40	1.32	1.83	2.30
40 to 50	1.97	2.56	3.10
50 to 60	3.60	4.32	4.51
60 to 70	10.80	11.26	9.36
70 to 80	} 31.70	32.50	
80 to 90		40.00	
90 to 93		67.00	
All Ages,	2.45	2.76	

The observations which have been made in this country are not sufficient to determine the amount of sickness at various periods or the whole of life. But, if we assume the average of the experience of the English Benefit Societies and the rates proposed by Mr. Edmonds, in the London Lancet, and apply these rates to our own population, we can approximate the probable number who are constantly sick. The following table is constructed by calculating the population of Massachusetts for 1849, and multiplying the numbers in each class by the several English rates of sickness.

Approximate number of persons between fifteen and seventy constantly sick in Massachusetts.

PERIOD.	CALCULATED POP- ULATION.	PER CENT. SICK.	NO. CONSTANTLY SICK.
15 to 20	87,392	1.36 *	1,188
20 to 30	185,500	1.63	3,025
30 to 40	136,410	2.06	2,810
40 to 50	77,850	2.83	2,203
50 to 60	51,530	4.41	2,262
60 to 70	28,849	10.31	2,933
15 to 70	567,531	2.52	14,421

¹ British Med. Almanac, quoted by Macculloch in Statistical Account of British Empire, vol. ii., p. 574.

* This rate is not in the statement of Mr. Edmonds or of the Benefit Societies. It is taken from the rates of sickness among the operatives in the Lancashire Factories.

NOTE B.—(PAGE 16.)

The forms of the policies of the Massachusetts and some other Health Insurance Companies thus describe the degree of sickness or vital depression, for which they pay the "sick allowance."

"In case the assured shall at any time, during the continuance of this policy, be rendered wholly incapable, by sickness or any bodily injury received subsequent to the commencement of this policy, of pursuing, superintending, or overseeing his ordinary business or occupation, for one week or more."

"Provided always, that in case such sickness shall be taken, or such injury received, in a duel, or in the commission of any crime or misdemeanor, or in any military or naval service whatever (the militia not in actual service excepted), or in case such sickness or bodily injury shall be occasioned by any unlawful or immoral conduct of the assured, or shall proceed from any chronic disease or affection with which the assured now is, or has heretofore been afflicted, the said company shall not be liable to the payment," &c.

The Benefit Societies usually admit, and the Insurance Companies give policies to, those only who are in sound health, and they pay "sick allowance" to none who are sick of any of the primary or secondary forms of venereal disease, or in consequence of intemperance, or who are injured in any fight or brawl or war. They pay for no period of sickness, however severe, which is less than one week, nor for any slight ailment which may diminish the vital forces, and partially impair one's vigor for any period, however long. Consequently the assumed amount of sickness or reduction of vital force, estimated from these and similar observations, must be very much increased, and probably might safely be doubled; and in Massachusetts, it may be assumed, that the number of persons, between 15 and 70, constantly sick, is, at least, 28,000, and not 14,411, as calculated in the preceding note.

NOTE C.—(PAGE 18.)

In a stationary population, where is neither immigration nor emigration, or where these balance each other, and where the number of births is the same from year to year, and the same also as the number of deaths, the average number of those who die, as shown by the bills of mortality, may be safely taken as a basis of comparison of the longevity of the classes or communities in which these deaths take place, with that of other classes or communities similarly circumstanced in respect to births and migration.

But, as in most classes or nations, these disturbing causes operate, to a greater or less extent, and especially in new nations like our own, scarcely any population can be considered as stationary, and therefore the comparison of the longevity of the people of various classes or places, must be made with some qualification, unless the disturbing causes in all are similar and equal.

The average age of the dying must bear a relation to the composition of the living population. In a new community, made up of immigrants, there is necessarily a preponderance of youth and children, and comparatively few aged persons; consequently the bills of mortality must show a lower average age than those of an old community, in which the oldest have had time to live to extreme old age, or one from which some have emigrated, and thereby diminished the numbers of the young families and children.

Likewise, in a community growing by the excess of births over the deaths, there must be a greater proportion of persons in the earlier years of life, than in another, where the births and deaths are equal.

Both of these states—that which is growing by immigration and that which is growing by excess of births—will show in their bills of mortality a greater proportion of deaths of children and youth, and consequently a lower average duration of life than other and stationary states; and yet the people in these growing states may be as healthy, and the expectation of life as great, as in the others whose bills show a greater longevity.

The ratio of deaths to the living population is liable to similar objections as a basis of comparison of mortality, inasmuch as this ratio must also bear some relation to the composition of the population. The liability to death is much greater at some periods of life than it is at others.

Mr. John Finlaison, the actuary of the British National Debt, made a report, in 1829, to the House of Commons, upon the comparative mortality at various periods of life. His calculations are founded upon the observation of the annuitants at his office. From his report, it appears that among males, in the course of a year, there will die,

Out of 1,000,000 within the 1st twelve months,	. . . . .	180,492
" " in the 14th year of age,	. . . . .	5,742
" " " 24th " "	. . . . .	15,074
" " " 35th " "	. . . . .	11,707
" " " 49th " "	. . . . .	14,870
" " " 59th " "	. . . . .	29,185
" " " 69th " "	. . . . .	61,741
" " " 79th " "	. . . . .	114,255
" " " 85th " "	. . . . .	178,130
" " " 89th " "	. . . . .	246,803

This corresponds very nearly with the deductions which the Registrar-General drew from the comparison of the 2,432,788 deaths, in England and Wales, of specified ages, during the seven years from 1838 to 1844, with the population which was enumerated in 1841.¹

Annual Mortality per million in each age.

AGE.	RATIO OF MORTALITY.		AGE.	RATIO OF MORTALITY.	
	Males.	Females.			
0 to 1	205,100	154,440	35 to 45	12,490	12,420
1 to 2	67,060	63,930	45 to 55	17,760	15,480
2 to 3	35,310	34,900	55 to 65	31,410	27,820
3 to 4	25,200	24,810	65 to 75	66,130	58,850
4 to 5	18,530	18,310	75 to 85	143,940	132,010
			85 to 95	296,460	275,530
0 to 5	70,720	60,370	95 & upw'ds	426,970	407,795
5 to 10	9,260	9,000	All ages.	22,700	21,040
10 to 15	5,040	5,480			
15 to 25	8,050	8,330	Living to 1		
25 to 35	9,680	10,090	death,	44.1	47.5

¹ Ninth Annual Report, p. 177.

Human mortality is the greatest in the extreme or the tender ages of life. In the first year, it is eighteen per cent. among the males of the more favored classes, the annuitants, and more than twenty per cent. among males of all classes of England. From the first year, the mortality diminishes, at first very rapidly, and afterward more slowly, until the age of 13, which is the healthiest and most secure period of life. From this age the mortality again increases, until the establishment of manhood, at the age of 23; again it diminishes until the age of 34, when the manhood is in its fullest vigor. From this period it again increases, and continues increasing to the latest age. At the age of 48, the mortality is almost the same as at the age of 23; and at the age of 84, it is almost the same as at the first year after birth.

The following calculations are made from the English Decennial Life Table, in the fifth report of the Registrar-General of England, page 367, and from the table showing the law of mortality, prepared by James Hayward for the New England Life Insurance Company.

Proportion of Deaths, in the decennial periods, to the Population living at the same periods.

DECENNIAL PERIODS OF LIFE.	PROPORTION PER CENT. OF DEATHS.		DECENNIAL PERIODS OF LIFE.	PROPORTION PER CENT. OF DEATHS.	
	English Life Table.	N. E. Life Table.		English Life Table.	N. E. Life Table.
Under 10 yrs.	29.3	*	50 to 60	18.5	20.7
10 to 20	6.4	6.1	60 to 70	35.4	38.8
20 to 30	8.6	8.1	70 to 80	61.2	65.5
30 to 40	10.7	9.9	80 to 90	87.8	89.9
40 to 50	13.3	13.	90 to 100	98.6	100.

It is plain, then, that the number of deaths in proportion to the whole population, would be less in a community or class of persons of whom a larger proportion are between the ages of 10 and 50, than in another community or class of whom the greater proportion are under and above these ages.

* The English table commences at birth, the New England table at 10 years of age; but from the similarity of the two tables in other respects, it is probable that they would agree in the first decade.

NOTE D.—(PAGE 19.)

The Registrar-General of England obtained, principally through the British foreign ministers, accounts of the population and mortality of most of the civilized nations. These were published at great length and minuteness in the sixth Report of Births, Marriages and Deaths. The following table is calculated and condensed from that work.

Population, Deaths, and proportionate Mortality.

Country.	Population	When enumerated.	Annual Deaths.	Years of Death.	Deaths per ct. of Pop.	Living to 1 Death.
Norway, . . .	1,123,072	1825 and 1835*	22,075	1825 to 1835*	1.9	50.8
Denmark, . . .	† 2,066,686	1835 to 1839*	45,153	1835 to 1839*	2.1	46.2
England & Wales,	15,906,741	1841	348,274	1837 to 1844*	2.18	45.6
Hanover, . . .	1,744,139	1842	40,843	1842	2.3	42.9
Sweden, . . .	2,894,927	1825 1830 1835*	68,756†	1826 to 1835*	2.37	42.1
France, . . .	33,477,588	1831 1836 1841*	837,849	1832 to 1841*	2.5	39.9
Hungary & Transylvania, }	14,917,159	1834 1837 1839*	389,634	1834 to 1840*	2.6	38.
Bavaria, . . .	4,370,977	1840	122,416	1838 1839	2.8	35.7
Prussia, . . .	14,928,501	1840	421,326	1839 1840 1841*	2.8	35.4
Saxony, . . .	1,623,052	1832 1834 1837 } 1840*	49,466	1832 to 1841*	3.	32.9
Austrian Empire,	16,410,186	1834 1837 1840*	510,203	1834 1837 1840*	3.1	32.
Austria, Up. & Low.	2,257,449	1834 1837 1840*	75,008	1834 1837 1840*	3.3	30.
Lombardy & Venice	4,630,986	1834 1837 1840*	153,096	1834 1837 1840*	3.3	30.
Wurtemburgh, .	1,646,354	1833 to 1842*	57,145	1833 to 1842*	3.4	28.8
Russia, . . .	§ 49,525,420	1842	1,856,183	1842	3.7	26.6
Russia, Northern,					{ less than 3.	
Russia in the Basins of the Don, Dnieper, Wolga }					{ 4.3 to 5.3	
Europe, . . .	167,548,237		4,997,427*		2.98	33.5

* Average population and mortality of these years.

† The population of Denmark in the years 1835 to 1839 is not stated. This number is calculated from the number and ratio of deaths which are given.

‡ The mortality of 1839, which was much increased by the cholera, 109 per cent. above the average, is not included.

§ Returns of Deaths, &c., received from this number of people. "The population of the Russian empire exceeds 60,000,000."

"In each year there has died 2.02 per cent. of the inhabitants of the canton of Geneva. This is a mortality less than that of England, which was 2.20 per cent. per year for the years 1838 to 1841; and much less than that of the Sardinian States, which was in ten years, 1828 to 1837, 3 per cent. per year."¹ "The mean age at death was 39.7 to 43.5 years, in Geneva, and 28 years in the Sardinian States."² "The rate of mortality was, in Batavia, 1 in 26; in Trinidad, 1 in 27; in St. Lucia, 1 in 28; in Martinique, 1 in 28; in Gaudaloupe, 1 in 27; in Havana, 1 in 33."³

NOTE E.—(PAGE 20.)

The mortality of cities is better known than that of rural or country districts. The diseases have been more faithfully observed and the deaths more accurately recorded and made known in regard to the towns than the country. We have, therefore, somewhat imperfect data for comparing the healthfulness of the one with that of the other. Yet almost all the data which have been found—the investigations in France, Belgium, England and the United States—show that life is shorter and deaths more frequent in the city than in the open country. Whether we compare the longevity, the proportion of deaths to the population, or the results of various diseases, we come to the same conclusion.

"This broad, irrecusable result is obtained from an immense number of facts, that certain diseases are much more fatal, and that the mortality is much greater, in towns than in the open country."⁴ This is shown by the following table, taken from the Registrar-General's 5th Report.⁵

¹ *Annuaire, De la Mortalité Genevoise*, par le Docteur Marc D'Espine, p. 26.

² *Ibid.*, p. 31.

³ Pritchard. *Nat. Hist. of Man*, i., p. 117.

⁴ Registrar-General's 5th Report, p. 409.

⁵ *Ibid.*, p. 403, 404, and 405.

*Population and Mortality of Rural and Town Districts of
England.*

CAUSES OF DEATH.	METROPOLIS AND DISTRICTS OF 25 TOWNS OR CITIES.	DISTRICTS OF 12 COUNTIES.
	Population enumerated in 1841.	
	3,759,186. Pop. to sq. m. 5,108	3,440,501. Pop. to sq. m. 199
	Annual Deaths in four years to 1,000,000 of the Living.	
All Causes,	27,073	19,300
I. Zymotic diseases—Endemics, Epide- mics, and Contagions, } Sporadic diseases,	6,013	3,422
II. Of uncertain and variable Seat,	3,034	3,237
III. Of the Nervous System,	4,267	2,256
IV. Of the Respiratory Organs,	7,967	5,327
V. Of the Organs of Circulation,	421	226
VI. Of the Organs of Digestion,	1,972	1,042
VII. Of the Urinary Organs,	117	101
VIII. Of the Organs of Generation,	276	166
IX. Of the Organs of Locomotion,	163	106
X. Of the Integumentary System,	36	23
XI. Old Age,	1,943	2,676
XII. External Causes—Injuries, Poi- soning, Asphyxia, }	860	713
I.		
1 Smallpox,	1,045	507
2 Measles,	914	364
3 Scarlatina,	988	478
4 Hooping Cough,	829	415
5 Croup,	268	201
6 Thrush,	108	93
7 Diarrhœa,	306	148
8 Dysentery,	47	31
9 Cholera,	32	17
10 Influenza,	50	94
11 Ague,	7	3
12 Remittent Fever,	12	8
13 Typhus,	1,254	998
14 Erysipelas,	133	53
15 Syphilis,	18	10
16 Hydrophobia,	2	1
II.		
17 Inflammation,	250	319
18 Hæmorrhage,	88	80
19 Dropsy,	914	913
20 Abscess,	94	67
21 Mortification,	116	91
22 Purpura,	6	5
23 Scrofula,	52	101
24 Carcinoma,	183	198
25 Tumor,	35	23
26 Gout,	20	16
27 Atrophy,	214	220
28 Debility,	758	938

TABLE, *continued.*

Causes.	Annual Deaths in four years to 1,000,000 of the Living.	
	Town Districts.	Country Districts.
29 Malformations,	16	17
30 Sudden Deaths,	288	250
III.		
31 Cephalitis,	267	111
32 Hydrocephalus,	876	334
33 Apoplexy,	422	387
34 Paralysis,	367	353
35 Convulsions,	2,000	852
36 Tetanus,	11	7
37 Chorea,	2	1
38 Epilepsy,	87	73
39 Insanity,	31	23
40 Delirium Tremens,	27	10
41 Brain, &c. disease of,	176	103
IV.		
42 Laryngitis,	9	6
43 Quinsey,	54	22
44 Bronchitis,	220	106
45 Pleurisy,	45	28
46 Pneumonia,	2,084	962
47 Hydrothorax,	132	153
48 Asthma,	687	196
49 Phthisis, or Consumption,	4,463	3,660
50 Lungs, &c. disease of,	273	173
V.		
51 Pericarditis,	15	9
52 Aneurism,	14	7
53 Heart, &c. disease of,	393	210
VI.		
54 Teething,	616	120
55 Gastritis, }		
56 Enteritis, }	660	366
57 Peritonitis,	23	12
58 Tabes Mesenterica	70	59
59 Worms,	30	30
60 Ascites,	12	9
61 Ulceration,	34	18
62 Hernia,	41	26
63 Colic or Ileus,	41	54
64 Intussusception,	12	8
65 Stricture,	11	10
66 Hæmatemesis,	7	6
67 Stomach, &c., disease of,	124	97
68 Pancreas, disease of,		
69 Hepatitis,	32	23
70 Jaundice,	57	55
71 Liver, disease of,	201	148
72 Spleen, " "	2	1
VII.		
73 Nephritis,	11	7
74 Ischuria,	5	6
75 Diabetes,	13	13
76 Cystitis,	8	8
77 Stone,	16	12

TABLE, *continued.*

Causes.	Annual Deaths in four years to 1,000,000 of the Living.	
	Town Districts.	Country Districts.
78 Stricture,	7	6
79 Kidneys, &c., disease of, VIII.	55	49
80 Childbirth,	221	137
81 Paramenia,	7	4
82 Ovarian Dropsy,	4	3
83 Uterus, &c. disease of, IX.	43	23
84 Arthritis,	2	2
85 Rheumatism,	72	48
86 Joints, &c., disease of, X.	95	56
87 Carbuncle,	1	3
88 Phlegmon,	4	6
89 Ulcer,	13	9
90 Fistula,	10	4
91 Skin, &c., disease of, XI.	7	6
92 Old Age, XII.	1,943	2,676
93 Intemperance,	19	7
94 Starvation,	15	8
95 Violent Deaths,	827	698

Of the whole 94 causes, beside old age, only 14, influenza, inflammation, scrofula, carcinoma, atrophy, debility, malformation, hydrothorax, colic or ileus, carbuncle, and phlegmon, produced more deaths (2,104) in the country, than (1,701) in the cities. From four other causes, worms, diabetes, cystitis and arthritis, the deaths were equal (53) in town and country. The deaths from old age were 37 per cent. more in the rural than in the city districts. The excess of mortality, from this cause, is rather an indication of healthfulness of any locality, inasmuch as it shows that so many more survive to a very late period. All the other 79 causes produced a greater number, and some a much greater number of deaths in the towns than in the open country. And, taking all the 95 causes, the proportion of mortality to 1,000,000 of the living population, is 40 per cent. greater in the former than in the latter. Or, while 100 die in the rural districts, 140 die in the dense towns; among the same number of people.

There is a still greater difference of mortality in some smaller

districts. The rural part of Surry contains 229,733 inhabitants, and the town of Liverpool 223,424. The deaths in 1841, were, in Surry, 4,256, or 1.85 cent. of the population; and, in Liverpool, 7,556, or 3.38 per cent. The proportion of mortality to the living was 82 per cent. greater in this town than in that county; or, while 100 die in Surry, 182 die in the compact town of Liverpool.

So far as we have the means of comparison, a similar excess of mortality is shown in the cities over that of the rural districts of this country.

Mortality of City and Country.

Place of Death.	Period of Death.	No. of Deaths.	Average Longevity.
			Years.
Massachusetts, not including Boston }	1842 to 1843	62,257	31.*
Boston,	1842 to 1843	18,834	21.64 †
Providence,	1840, 1843 to 1848	5,036	21.8 †
New York State,	1847	14,525	29.9*
New York,	1838 to 1842, 1847-48	69,791	19.9 †
Philadelphia,	1837 to 1846	56,138	20.47 †
Baltimore,	1846 1847 1848	10,267	20.43 †
Louisville, Ky.	1840 to 1843	2,021	17.86 †

Mortality of Cities of different densities of Population.¹

Place.	Pop. to sq. m. of builded area.	Deaths, 1 in	Average age at death.	NUMBER OF DEATHS TO EVERY 1,000 DEATHS,	
				Under 5 yrs.	Over 70.
London, ²	50,000	37.38	26.5 yrs.	408	111
Birmingham,	40,000	36.79		482	88
Leeds,	87,256	36.73	21.	480	79
Manchester,	100,000	29.64	20.	510	60
Liverpool,	138,224	28.75	17.	528	54

* Calculated from the Annual Registration Reports.

† Calculated from the Annual Bills of Mortality.

‡ Calculated from the Burial Ground Register.

¹ Condensed from First Report of Health of Towns Commission, vol. i., pp. 125, 126 and 130.

² Including only Kensington, Strand, Whitechapel and Bethnal Green, but not the healthiest districts.

There seems to be a constant relation between the density of population and mortality, so that in two towns, with different densities, but in all other things equal, the number of deaths in one may be determined by the rate of mortality of the other. This relation is not that of regular progression, but the proportion of mortality in two places will be as the 6th roots of their densities. Thus, if three towns have severally 64, 4096, and 262,144 inhabitants to the square mile, the mortality in these will be as 2, 4, and 8, which are the 6th roots of these numbers. If stated algebraically, and if d represent the density of one, and d' the density of the others; and m the mortality of one, and m' the mortality of the others, the formula will be $m' : m :: \sqrt[6]{d'} : \sqrt[6]{d}$.

But there are many other circumstances, such as narrow and filthy streets, bad drainage, imperfect ventilation, poverty and bad habits of the people, that co-operate with the density of population and increase the force of mortality. Comparing two districts of London, which combine the differences of social and physical condition with the difference of density, we find a greater discrepancy of mortality than would be produced by the difference of densities alone.¹

Districts.	Persons to sq. m.	Persons to a house.	Average Prop'ty to 1 Person.	Mortality of Females.	Expecta- tion of life at birth.
St. George, Hanover Sq.	39,018	8.1	£9 2s.	1.7	38.5 yrs.
White Chapel,	127,313	8.7	£2 16s.	2.9	32.4

Villermé, in the *Annales D'Hygiene*, July, 1830, shows that wealth, independent circumstances, and misery, constitute in Paris the principal causes of the differences in the rate of mortality.²

In six best arrondissements, in which the localities had an average value of 290 francs, the deaths were 1 in 65 of the living; but in six other arrondissements, in which the localities had an average value of 206 francs, the deaths were 1 in 51.³

¹ Registrar-General's Fifth Report, p. 424 and 443.

² Quetelet on Man, book i., chap. vi.

³ Villermé in *Annales D'Hygiene*, tom. iii., p. 310 and 312.

Benoiston de Chateauneuf, in an article upon the influence of Wealth and Poverty on Mortality, states ¹ that the annual deaths among 10,000 living, were, in Paris,

Age.	Rich.	Poor.	Age.	Rich.	Poor.
30 to 40	108	157	60 to 70	360	750
40 to 50	117	213	70 to 80	804	1,436
50 to 60	199	359	80 to 90	1,322	10,000

Probably the difference is still greater in the earlier ages, and especially in infancy.

The effect of seasons on mortality is different in city and country, as shown by the following table, calculated from 1,770,260 deaths in Belgium,² and from 210,578 deaths in the States of Massachusetts and New York,³ and the cities of Boston⁴ and New York.⁵

Ratio per ten thousand of all Deaths.

SEASON.	BELGIUM.		MASSACHUSETTS AND NEW YORK.	
	City.	Country.	City.	Country.
January,	1,158	1,212	795	711
February,	1,088	1,198	770	750
March,	1,050	1,192	809	837
April,	1,002	1,120	777	787
May,	946	978	743	718
June,	901	882	721	671
July,	874	809	992	787
August,	910	822	1,059	1,083
September,	971	888	939	1,171
October,	999	934	816	954
November,	1,024	935	762	739
December,	1,076	1,030	816	773

¹ Annales D'Hygiene, tom. iii., p. 12.

² Quetelet on Man, book i., chap. v.

³ Registration Reports of Massachusetts, 1842 to 1848; and of New York, 1847.

⁴ Shattuck's Census of Boston.

⁵ Bills of Mortality of New York, 1838 to 1842, and 1844 to 1848.

Ratio of Mortality, according to season, per ten thousand of all.

PLACE.	WINTER—NOV. TO APRIL.		SUMMER—MAY TO OCT.	
	Deaths.	Ratio.	Deaths.	Ratio.
BELGIUM.				
Cities,	330,793	5331	289,602	4668
Country,	640,685	5571	509,180	4428
UNITED STATES.	971,478	5487	798,782	4512
Boston and	61,146	4730	68,105	5269
New York,	37,417	4600	43,910	5399
Mass. and N. Y.	98,563	4680	112,015	5319

The history of the progress of population of towns shows a corresponding increase of mortality.

Population, Mortality, and Longevity of Boston.

Periods.	Average Population.	Living to 1 Death.	Average Longevity.
1811 to 1820	38,542	47	27.75 years.
1821 to 1830	52,395	49	25.88 "
1831 to 1840	73,196	46	22.72 "
1841 to 1848	112,536	41	21.64 "

A similar table in regard to the city of Preston, England, is given by the Rev. Mr. Clay.¹

Years.	Population.	Living to 1 Death.	Average Longevity.
1791	8,000	45	28.60
1811	17,065	48	19.99
1841	50,131	33	19.54

Making all due allowance for the difference of composition of the population in the city and in the country, there seems to be less vital force produced, disease seems to be more prevalent and

¹ First Report of the Health of Towns Commission, vol. i., p. 176.

fatal, death more frequent, and the expectation of life less in the densely inhabited towns than in the rural and open districts.

There are apparent, and perhaps real exceptions to this rule. The deaths in the city of St. Petersburg, in Russia, were 2.7 per cent., while those in the province of St. Petersburg were 4.09 per cent.¹ Quetelet says, that the expectation of life in Belgium, is, for boys, 21 years, in the towns, and 24 years in the country; but, for girls, it is 28 years in the towns, and 27 years in the country.²

It is generally supposed, that some of the compact and well-paved cities of new countries, as Louisville, Ky., Cincinnati, Ohio, St. Louis, Mo., &c., are more healthy than the surrounding and open country. This may be due, not to the density of the population, but to the prevention of the miasmatic exhalation by the buildings and pavements.

“Every population throws off insensibly an atmosphere of organic matter, excessively rare in country and town, but less rare in dense than in open districts; and this atmosphere hangs over cities like a light cloud, slowly spreading, driven about, falling, dispersed by the winds, washed down by showers.”

“The exhalations from sewers, church-yards, vaults, slaughter-houses, cesspools, commingle in this atmosphere, as polluted waters enter the Thames, and, notwithstanding the wonderful provisions of nature for the speedy oxidation of organic matter in water and air, accumulate, and the density of the poison (for in the transition of decay it is a poison), is sufficient to impress its destructive action on the living.”

“The existence in the atmosphere of organic matter is therefore incontestable; and, as it must be most dense in the densest districts, where it is produced in greatest quantities, and the facilities for decomposing it in the sunshine and sweeping it away by currents of wind are the least, its effects—disease and death—will be most evident in towns and in the most crowded districts of towns.

“It is to this cause, it appears to me, that the high mortality of towns is to be ascribed; the people live in an atmosphere charged

¹ Registrar-General's 5th Report.

² Journal des Travaux de la Société Française, de Statist. Univers., tom. iii., p. 698.

with decomposing matter, of vegetable and animal origin ; in the open country it is diluted, scattered by the winds, oxidized in the sun ; vegetation incorporates its elements, so that, though it were formed, proportionally to the population, in greater quantities than in towns, it would have comparatively less effect.”¹

NOTE F.—(PAGE 25.)

“ Whatever produces pain or other inconvenience, is an improper stimulus.”

“ This peculiar, distinctive, or eclectic sensibility, is impaired by over stimulation. Persons who have never smoked tobacco, will generally be sick when they first begin to do so ; but, after a short time, they can smoke pipe after pipe without inconvenience. When a man, for the first time, swallows a glass of spirit, his guardian angel, sensibility, tells him — not, indeed, in a language that can be heard, but in one far more impressive, a language that can be felt, as plainly as pain can speak — that raw spirit is an injurious spirit. Yet what does the fool do ? He turns a deaf ear to the intimation which could be, by possibility, no other than a friendly one, and obstinately perseveres till the voice that warned him warns him no more. Then, with a folly scarcely less than idiotic, he exclaims, Behold, it does me no harm. It gives me no pain. It gives me no inconvenience ! Thus appealing, in his defence, to the silence of that voice which he has himself *forcibly* silenced.”²

NOTE G.—(PAGE 33.)

Dr. Samuel G. Howe, in his valuable report on the idiots of Massachusetts, printed by order of the Legislature, Feb. 1848, says, “ If ever the race is to be relieved of a tithe of the bodily ills which flesh is now heir to, it must be by a clear understanding of, and a willing obedience to, the law which makes parents the

¹ Registrar-General's 5th Report, pp. 418, 419.

² Life, Health and Disease, by Edward Johnson, M.D., London, pp. 109 to 111.

blessing or the curse of the children, the givers of strength and vigor and beauty, or the dispensers of debility and disease and deformity. It is by the lever of enlightened parental love, more than by any other power, that mankind is to be raised to its highest attainable point of bodily perfection."¹

The same report contains many striking facts that show the connection between the organization and health of the parents and those of the children.

Five hundred and seventy-five idiots were examined, and their parentage and history ascertained, and a large proportion of their parents were found to be diseased or of imperfect organization.

Of the 575 idiots, 419 were known to be of decidedly scrofulous families; 144 were children of parents who were known to be habitual drunkards; 50 were children of idiotic or insane parents, on one or both sides; 12 were children of parents who were advised to marry on account of ill health; 211 had near relatives who were idiotic or insané.

"In 15 families, all the children who were born of one marriage were idiotic or very puny, while all those who were born of another marriage of the surviving *healthy* parent, with a healthy person, were sound in body and mind."²

"The statistics of 17 families, the heads of which, being blood relatives, intermarried, tells a fearful tale." "Most of the parents were intemperate or scrofulous; some were both the one and the other; there were other causes to increase the chances of infirm offspring, besides that of the intermarriage. There were born unto them *ninety-five* children, of whom FORTY-FOUR were idiotic, twelve others were scrofulous and puny, one was deaf, and one was a dwarf! In some cases, all the children were either idiotic or very scrofulous and puny. In one family of eight children, five were idiotic.³ Of the 95 children, 58 were imperfect, and only 37 were healthy.

"There can be no question that intermarriages between the collateral branches of the same family tend more than any thing else to fix, multiply and aggravate hereditary predisposition,"

¹ Page 57.

² Dr. Howe's Report, Appendix, p. 45.

³ Ibid., p. 90.

"and hence nothing can be wiser, on physical as well as on moral grounds, than the restraints which divine and human laws have concurred in laying on marriages between relatives."¹

"Another practical inference is the propriety of avoiding matrimonial alliances between families possessing the same hereditary taint, and generally of forbidding all such alliances between kindred families, for few are free from some congenital weakness or susceptibility."²

In the reports of some of the Lunatic Hospitals of America and Europe, the history of the patients is given. The following table shows that many of them inherit their disorder from their ancestors.

Hospitals.	Patients whose history is known.	Patients whose disease is hereditary.
American Hospitals, ³	7,615	1,788
English and Scotch Hospitals, ⁴	1,156	81
French Hospitals, ⁵	2,812	680
	11,583	2,549

In this connection, Esquirol says, ⁶ "The hereditary taint is the most common cause of insanity among the wealthy; it produces one sixth of the lunatics among the poor. It is remarkable in England, especially among the Catholics, who always intermarry.

"What a lesson for those parents, who, in marrying their children, consult their ambition rather than the health of their posterity."

"No fact is more incontrovertible than that insanity * * or a predisposition to mental derangement, when it has once arisen, is susceptible of being transmitted. To this, every author bears

¹ Good, Study of Medicine. Art. Genetica, vol. iv., p. 27.

² Joseph Brown, in Cyclopædia of Practical Medicine. Art. Hereditary Transmission of Disease.

³ Reports of Lunatic Hospitals at Worcester, Mass., Utica and Bloomingdale, N. Y., Concord, N. H., Hartford, Ct., and Columbus, Ohio.

⁴ Reports of Hanwell, Lancaster and Dundee Hospitals.

⁵ Esquirol. *Maladies Mentales*, tom. i., p. 64, and ii., pp. 144 and 683.

⁶ *Des Maladies Mentales*, tom. i., pp. 64, 65.

testimony, and the records of every institution corroborate their statements."¹

"The hereditary predisposition to scrofula, consumption, gout and insanity, is essentially a part of the medical creed.

"Idiocy is unquestionably hereditary.

"Beside these very common examples, various other diseases, such as asthma, angina pectoris, a general hæmorrhagic disposition, apoplexy, epilepsy, and various nervous disorders, blindness and deafness, not congenital, and according to Dr. Adams, elephantiasis, are transmitted in predisposition, from generation to generation."²

"That pulmonary consumption is a hereditary disease; in other words, that the tuberculous constitution is transmitted from parent to child, is a fact not to be controverted."³

"A deteriorated state of health in the parent, from any cause, to a degree sufficient to produce a state of cachexia, may give rise to the scrofulous constitution in the offspring."⁴

"We never see parents in an unhealthy state, whatever may be its nature, without finding, at the same time, that their children are strongly predisposed to tuberculous disease."⁵

"The children of those who have suffered long from dyspeptic complaints, gout, cutaneous affections, or any other form of chronic disease, originating in derangement of the digestive function, are very frequently the subjects of scrofula, or of disorders which dispose to, or ultimately induce, tuberculous cachexia."⁶

"In order, therefore, effectually to prevent the extension of the tuberculous disease, we must, in the first place, direct our attention to the state of the parents."⁶

"The hereditary transmission of physical and moral qualities, so well understood and familiarly acted on in the domestic animals, is equally true in man.

"All the native deformities of mind and body, which spring up so plentifully in an artificial mode of life, are handed down to

¹ Dr. Awl, in Report of Ohio Lunatic Asylum, for 1847, p. 55.

² Joseph Brown, in Cyclopedia of Practical Medicine. Art. Hereditary Transmission of Disease.

³ Dr. Clark, on Consumption and Scrofula, p. 220.

⁴ Ibid., 222.

⁵ Ibid., p. 223.

⁶ Ibid., p. 269.

posterity, and tend by their multiplication and extension to degrade the race."¹

"Not only are wit, beauty and genius, propagable, but dulness, madness, and deformity of every kind.

"That fearful host of diseases, gout, consumption, scrofula, leprosy, and madness, which originated, perhaps, in the first sufferer accidentally, are propagated so deeply and so extensively that it is difficult to meet with a family that is totally free from hereditary taint."²

The effect of early marriage upon the health and longevity of the offspring is seldom considered, but the following facts show that this is a very important consideration.

In England, the deaths of children whose mothers were married between the ages of 13 and 16, were 444 per 1,000; and of those whose mothers were married between the ages of 29 and 32, only 313 per 1,000.³

Two sevenths of the children of peeresses who were married under 16, died before they reached the marriageable age; while only a fraction more than one sixth of the children of those who were married between the ages of 24 and 27, died before this period of maturity.³

The permanent increase of population was about 50 per cent., 450 to 315, greater in the families in which the mothers married between 24 and 27, than in those in which they married between 12 and 15.³

NOTE H.—(PAGE 36.)

The government of the State of Massachusetts, from the year 1817 to 1848, granted to the Agricultural Societies, \$130,989. This money is principally expended in premiums for the successful growth and improvement of animals and vegetables of various kinds, or for the encouragement of, and reward for, the attention paid by individuals to the enlargement of the life and the increase of the vital force of these lower orders of beings.

¹ Lawrence on Man, p. 459.

² Good, Study of Medicine. Art. Genetica, vol. iv., pp. 26, 27.

³ Saddler. Law of Population, vol. ii., pp. 274, 281.

According to the standing law of the State,

SECT. 1. "Every incorporated agricultural society, which shall have raised, or may hereafter raise, by contribution of individuals, and put out at interest, on public or private security, the sum of one thousand dollars, as a capital stock for the use of such society, shall be entitled to receive, in the month of October annually, out of the treasury of the Commonwealth, the sum of two hundred dollars, and in that proportion annually for any greater sum so contributed," &c.

SECT. 4. "Every agricultural society which shall receive the said allowance from the public treasury, shall offer annually, by way of premiums, or shall apply otherwise, at their discretion, for the encouragement or improvement of agriculture or manufactures, a sum not less than the amount received as aforesaid, out of the public treasury,"¹ &c.

In 1848, the nine societies that draw funds from the State, offered in premiums, 5,806 dollars for improvements in agriculture, 593 dollars for manufactures, and 400 dollars in discretionary premiums. The Annual Transactions of the Agricultural Societies of Massachusetts, published by the State, for 1848, contains² a list of all the objects for which these premiums were offered and given. They include improvements in the vitality of the various animals and vegetables that are desirable to the farmer, and also the removal of the obstacles to their most perfect development and growth.

NOTE I.—(PAGE 40.)

Longevity and mortality have not been always stationary. In general, they have varied with the progress of civilization. As the external circumstances and domestic condition of mankind have improved, vital force has increased and life has been expanded.

In ancient Rome, the expectation of life among the best classes,

¹ Revised Statutes, chap. xlii.

² Report, 186 to 189.

was at birth, 30 years, which is 15 years less than the same classes in England, and 12 less than in France.¹ In all civilized countries from which data can be obtained, with the exception of three,² the mortality has evidently diminished and longevity increased.

Between the ancient Romans and the present generation in England and France, the following shows the advancement of the mean of longevity.³

Age.	Ancient Italy.	England.		France.	
	yrs.	yrs.	ms.	yrs.	ms.
20	30	41	6	39	3
30	25	34	4	28	6
40	20	27		22	10
50	9	21	1	17	3
60	5	14	4	11	11

"In the 16th century, half of the children that were born, died at or about the age of 4 years 11 months, and the average duration of life was 18.5 years. In the 17th century, one half died at the age of 11 years 7 months, and the mean longevity was 27 years 2 months. In the 18th century, one half were dead at the end of 27 years and 2 months, and the mean duration of life was 32 years and 2 months. In the 19th century, this progression was much increased."³

At the present time, 17 per cent. of the children who are born in Prussia, die in their first year. Not many years ago, it was deemed satisfactory if only 40 per cent. died in the same period."⁴

Some parishes of York, Eng., have been much improved, by widening some of the streets, taking down the projecting houses which almost met at the upper stories, by paving and draining, &c. Consequently mortality diminished, and in the parish of St. Helen, Stonegate, the mean age at death increased from 23.4

¹ Saddler. Law of Population, vol. ii., p. 480.

² The mortality has remained the same in Russia and Norway, for 30 years. It has increased in the kingdom of Naples.—*Journ. des Trav. de la Soc. Française, de Statist. Univ.*, tom. iii., p. 314.

³ *Journ. des Trav. de la Soc. Française de Statist. Univ.*, tom. i., p. 83.

⁴ London Statist. Soc. Reports, vol. ii., p. 364.

years, between 1816 and 1821, to 39.9 years, between 1839 and 1841; and in St. Michael, Spurrier-gate, from 28.8 years to 43.3 years, in the same periods.¹

Very great improvements have been made in the advance of civilization, by removing the causes of endemic and epidemic disease. Villermé states,² that at Viarreggio, in Lucca, the population was small, miserable and unhealthy. They were subject every year to violent and fatal attacks of intermittent fever, until 1741, when a dam was built to keep out the overflow of the sea, and gates opened to let out all the drainage, but closed when the water of the sea rose to press against them. The fever disappeared at once, and now the population of this place has very much increased, and the people are among the healthiest, the most prosperous and industrious in Tuscany.

Some diseases, which were formerly prevalent and fatal, have very much diminished. Sydenham, speaking of the "numerous tribe of diseases comprehended under the general name of fevers," says, "This destructive tribe of diseases, which afflicts mankind daily, and destroys at least *two thirds* of the human species, except such as die of violent death—" ³ This class of diseases has diminished so much from the time of Sydenham, that, out of 1,692,251 deaths which took place in England and Wales, from all known causes, in the years 1838 to 1842, only 336,727, or one fifth, were from the whole tribe of endemic, epidemic and contagious diseases, including all fevers and many others.

"Civilization, which sweetens the existence of man, has also prolonged it: the progress of knowledge has contributed to the health of individual houses and the interior of cities." ⁴

The deaths⁴ in England and Wales were in

1700	one in	43	1806 to 1810	one in	49
1750	"	42	1816 to 1820	"	55
1776 to 1800	"	48	1826 to 1830	"	51

"France, like England, has experienced a diminution of mortality. According to Villermé,⁴ it was computed that in 1781 one

¹ Dr. Thomas Laycock in Health of Towns Rep. vol. i., p. 240 and 243.

² Annales D'Hygiene, tom. ix., p. 9.

³ Swan's Sydenham, chap. vii., § vi., p. 290.

⁴ Quetelet on Man, Book i., chap. vi.

death took place in 29; in 1802, one in 30, and in 1825, one in 40 inhabitants."

"In Sweden, from 1755 to 1775, the mortality was one in 35; from 1775 to 1795, one in 37;¹" and from 1816 to 1835, one in 42.²

"M. Moreau de Jonnes, in a note on the mortality of Europe, has presented a table which likewise tends to prove the influence of civilization on the numbers of deaths in periods the intervals of which have been marked by social ameliorations."¹ The following table is taken in part from that of Moreau de Jonnes, and in part from other sources.

Quetelet says in a note to this table,³ "Several numbers must certainly appear to be doubtful." Every one which could be compared with the more reliable data of population and mortality is found to be inaccurate. The more rigid deductions from the numbers of the living and the deaths in Sweden, Denmark, Prussia, England, France and Lombardy, at the later period, are therefore substituted here.

Countries.	Years.	One death to	Years.	One death to
Sweden, ²	1751 to 1770	35.49	1816 to 1835	42.
Denmark,	1751 to 1754	32.	1835 to 1839	46.2*
Germany,	1788	32.	1825	45.
Prussia,	1717	30.	1839 to 1841	35.4*
Holland,	1800	26.	1824	40.
England,	1690	33.	1837 to 1844	45.6*
France,	1776	25.5	1832 to 1841	39.9*
Canton de Vaud,	1756 to 1776	35.	1824	47.
Lombardy,	1767 to 1774	27.5	1834 1837 1840	29.4*
States of the Church,	1767	21.5	1829	28.
Scotland,	1801	44.	1821	50.

¹ Quetelet on Man, book i., chap. vi.

² Calculated from a table in Milne on Annuities, and in 5th Rep. Reg. Gen.

³ These statements are given as they are found in Quetelet. He gives them on the authority of Rickman and Marshall, who are not ordinarily to be questioned. But these numbers are the results of estimates in part, and the more recent facts developed by the registration show the mortality to have been greater than was supposed.

* Calculated from tables in 5th Rep. Reg. Gen.

The amelioration of the condition and the improvement in vitality in some cities has been still greater. The most remarkable is shown in the records of the mortality of Geneva, prepared and published by Mr. Edward Mallet, and quoted by Mr. Chadwick.¹

The Probabilities of Life to every individual born, were	Yrs. Ms. Ds.			Proportionate rate of Increase as compared with the end of the 16th Century.	
Toward the close of 16th Cent'y	8	7	26	100	
In 17th Century,	13	3	16	153	53 per cent.
1701 to 1750,	27	9	13	321	221
1751 to 1800,	31	3	5	361	261
1801 to 1813,	40	8		470	370
1814 to 1833,	45	0	29	521	421

In some cities the effect of these ameliorations has been more than counterbalanced by the effect of the increase of density of population, as in Boston and Preston, before quoted.

In New York, during forty-four years, there has been a small increase of mortality, notwithstanding the introduction of water and other improvements. The growth of that city has been rather by expansion than by condensation.

Mortality of New York at various Periods.

Years.	Average Population.	Deaths, 1 in	Per Cent.
1805 to 1820	98,186	40.62	2.46
1821 to 1830	164,616	38.44	2.6
1831 to 1840	263,919	35.24	2.83
1841 to 1848	360,732	35.17	2.87

The facts gathered by Dr. Noah Webster, and published in his History of Epidemic Diseases, show that these have become less frequent and fatal with the progress of civilization, and consequently there have been great improvements in health and decrease of mortality since the middle ages, and especially within the last two centuries, throughout the civilized world.

The plague, which was very frequent and fatal in various parts of Europe previous to the eighteenth century, has appeared but

¹ Sanitary Report on the Laboring Classes, p. 175.

rarely within the last hundred years, except in the Levant and in other countries bordering on the Eastern Mediterranean Sea.

The yellow fever has ceased to visit most of the places in which it formerly appeared. Other fevers of a malignant nature, which formerly prevailed as epidemics, with destructive force in many places, now seldom appear, except as sporadic cases and with comparative harmlessness.

The virulence of scarlatina, measles, anginas, influenza, and some other diseases, has yielded to a milder form of these disorders, and consequently the mortality from these causes is diminished.

Fifty years ago, Dr. Webster said,¹ "the disappearance of the long fever, so called, is another most consoling circumstance. This species of typhus fever was formerly one of the most terrible diseases of our climate. At present it is a rare occurrence.

"On the whole, we have a very clear proof, that the *quantity of disease*, in this country, has been diminished within half a century. The yellow fever, that is, the pestilential fever of summer and autumn, was formerly as frequent and as malignant as in this age, while the inflammatory fevers of winter and the long fever have almost disappeared as epidemics. The intermittents and remittents of autumn are greatly decreased in the northern States; and the dysentery has not increased in frequency or virulence. Anginas have never been so fatal as they were between 1735 and 1743.

"It is probable that some of these changes in the character of diseases may be ascribed to alterations in our climate or modes of living, and therefore may be permanent."

The ameliorations of disease have been greater within fifty years than in any previous period. These improvements relate to epidemic diseases which prevail generally for longer or shorter periods, through any district or country. Many of them are owing to changes in the face of the earth, clearing of forests, drainage, cultivation, &c. But many more of them are due to the changes in the manner of life, the arrangement of towns, the structure of houses, and the personal habits of mankind.

¹ History of Epidemic Diseases, vol. ii., p. 37, published in 1800.

The same regard to the laws of life must cause still further changes in the manner of living and personal habits, and these may diminish the attacks, lessen the force and disarm the virulence of sporadic as well as of epidemic diseases ; and thus the amount of vital force and the longevity of man will increase, until, in the progress of generations, we shall attain to the largest expansion and longest duration of life intended for humanity on earth.